Chapter 10

Chain-of-Custody

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1.0 Introduction

An essential part of any sampling or analytical process is ensuring the integrity of the sample from collection through data reporting. A Chain-of-Custody is necessary if there is any possibility that litigants will use analytical data or conclusions based upon that data in litigation. This chapter describes the components of a Chain-of-Custody and the procedures for the use. "Chain-of-Custody" is defined as the documentation of the history of samples through all possession and handling from the time of collection through analysis and final disposition.

Consider all ambient sampling data collected in the State of Indiana as having potential use in court; therefore, all sampling data must follow a Chain-of-Custody procedure. In cases involving no litigation, many Chain-of-Custody procedures are still useful for routine control of validity of sample data.

2.0 Sample Handling and Custody

2.1 Sample Handling

Only a few air monitoring programs still involve the actual handling of samples. These are manual methods of lead, particulate sampling, toxic sampling, and PAMS. In these instances media-handling process is where the largest portion of measurement error occurs. It is critical that samples are handled as specified in SOPs. The major components of sample handling include labeling, sample collection, and transportation.

2.2 Sample Labeling

The labeling or proper marking of samples and monitoring devices will help to ensure positive identification throughout the sampling and analysis process. If ink is being used for the marking then it must be indelible and unaffected by the gases and temperature to which it will be subjected. Other methods such as bar code identification can be used as long as it does not impair the capacity of the filter to function.

All transport containers must have a unique identification to exclude the possibility of interchange. The I.D. number of the filter or sample card should be recorded and accompany the sample.

The sample must be properly handled to ensure that there is no contamination and that the sample analyzed is actually the sample taken under the condition reported. Any security measures taken should be documented by written record.

Strip charts from automated methods must be identified. The information must be placed upon each strip chart as to not interfere with any of the data recorded on the chart. The marking should be indelible and permanently affixed to each strip chart.

2.3 Sample Collection

Once the sampling process has occurred, the sample must be carefully removed from the monitoring device and placed in a sealed, nonreactive container. The sealing process depends on the type of container used; most containers can be sealed sufficiently using a piece of tape or adhesive. This is done to protect the sample from accidentally being exposed, and if there is a possibility of tampering, then self-adhesive stickers are needed that can be signed by the sample handlers.

2.4 Sample Transportation

During the transportation of samples and other monitoring data, it is important to eliminate the possibility of tampering, accidental destruction, and any physical or chemical action on the sample. The person who has custody of the samples, strip charts, or other data must be able to testify that no tampering has occurred. Security must be maintained continuously. To ensure that none of the sample has been lost, mark all liquid levels with a marker that will be indelible. For stainless steal containers for PAMS, canister pressures should be recorded, and upon receipt the pressure should be compared.

2.5 Sample Custody

A sample or data is considered under a person's custody if:

- it is in a person's physical possession
- in view of the person after he has taken possession
- secured by that person so that no one can tamper with the sample
- secured by that person in an area restricted to authorized personnel

The fewer people handling samples and data, the better, and anyone who does handle such samples or data should be associated with the project.

3.0 Continuous Monitoring Data

Unique Chain-of-Custody problems may occur with fully automated data acquisition systems. No one possesses the data as it travels from the sampling site to the data processing facility. Site operators should equip all stations with primary and secondary recording devices. Reporting organizations must maintain Chain-of-Custody procedures for printouts and strip charts.

3.1 Limited Access

Site operators should maintain all monitoring devices in an area of limited access (i.e., lock rooms or stations and allow access to only those personnel whose work requires their entry into the area).

3.2 Installation and Removal of Data Charts

Anytime a continuous monitoring chart or printout is installed in or removed from a recorder or computer the following information should be placed on that chart/printout:

- Sample location
- Parameter(s) sampled
- Color code identification (i.e., charts with dual parameter recording capabilities should identify which pen color is recording which parameter)
- Time of installation/removal
- Date of installation/removal
- Operator identification

When removing data from the station, log it out in the station record log and include:

- Date and time of removal
- Inclusive dates removed
- Operator identification

3.3 Transfer of Raw Data

When continuous data arrives at the point of reduction (local agency office, laboratory, or OAQ, Ambient Monitoring Section office) and there is a physical exchange of possession, a Chain-of-Custody form must accompany the data (See Form 1 for an example of a continuous data Chain-of-Custody form). When mailing data to its reduction point, transportation precautions should be followed to avoid tampering.

3.4 Storage of Raw Data

After the data is reduced and quality assured, it should be stored for a minimum of ten years, according to the Office of Air Quality (OAQ) guidelines.

4.0 Intermittent Sampling Data

4.1 General Information

All intermittent samples (i.e., particulate filters, PAMS) must be accompanied by a Chain-of-Custody form.

Label and identify samples with the following information using an indelible marking device:

- Sample location
- Sample number
- Parameter(s) sampled (i.e., PM-10, $PM_{2.5}$,TSP, Pb)

- Time of sampling/removal
- Date of sampling/removal
- Operator signature
- Sampling equipment identification (i.e., motor numbers)
- Flow controlling device identification
- Sampling conditions (i.e., meteorological data, flow readings, etc.)

4.2 In-House Sample Analysis

If the monitoring agency does the actual analysis, laboratory data books will be sufficient Chain-of-Custody since the following information is contained in those lab books:

- Date samples were received in the laboratory
- Signature or initials of sample custodian
- Identification of samples (filter numbers)
- Date of sample analysis/signature or initials of analyst
- Date the filter was quality assured/signature or initials of QA staff member
- Parameters analyzed/results
- Disposition of samples

After completing the analysis of the sample, store the sample in the original field filter card and store in a locked, limited access area for ten years (according to OAQ guidelines).

4.3 Outside Agency or IDEM Laboratory Analysis

When samples collected at one location are mailed or hand carried to another agency (IDEM lab for example) for analysis, the Chain-of-Custody procedures must be followed. Again keep in mind the fewer people handling the samples the better.

All samples or sample lots must be accompanied by a Chain-of-Custody form (see Forms 1, 2, 3, and 4 for examples of forms). These forms must include who relinquishes the sample and the signature of the person(s) who receives the sample(s).

All samples must be hand carried or sent by a reputable courier service such as the U.S. mail. The shipping envelopes must be sealed.

Once the samples have been delivered to the laboratory, the addressee or a designated substitute should make sure the package has not been tampered with. The addressee should then open the package and verify the contents. He should sign on the accompanying form that the packages were or were not received in the original package and that all appropriate information has been addressed. The samples should be logged in at the laboratory facility and be placed in limited access area until and during analysis. When dealing with multiple parameters in the same package container, each technician or analyst handling the samples or portions of the sample indicates handling by signing the Chain-of-Custody form.

5.0 Conclusion

Chain-of-Custody procedures must document samples from the beginning to the end of useful life. Once a sample has been taken or continuous monitoring data collected, that sample/data must not lose its accountability. It must be possible to document in court where the samples have been and who has had access to them every minute of their "lifespan" (i.e., through storage and disposal according to the OAQ guidelines). Forms included in this chapter are intended as examples and agency specific forms may be designed. Specific Chain-of-Custody forms for other networks operating in Indiana should be sent to the IDEM/OAQ Quality Assurance Section Chief, for comment and approval before being used in a network.

Form 1
Continuous Monitoring Data Chain-of-Custody Record

Sample Site Identification: _____

Parameter/Inclusive Dates: _____

Parameter/Inclusive Dates: _____

Parameter/Inclusive Dates: _____

Collector's Name and Organization: _____

Shipped Via: _____

Sample/Data Receiver: _____

1. _____

(Organization/Section Receiving Data/Sample)

2. _____

(Organization/Section Receiving Data/Sample)

3. _____

(Organization/Section Receiving Data/Sample)

Chain of Custody:

1. _____

(Signature, Title, Date Deposition)

2. _____

(Signature, Title, Date Deposition)

3. _____

(Signature, Title, Date Deposition)

Remarks:_____

_____

_____

_____

_____

Form 2
Intermittent Sampling Chain-of-Custody Record

Reporting Organization: _____ **Operator:** _____

Sample Identification:

Site	Filter #	Run Date	Site	Filter #	Run Date

Sample Receiver:

1. _____
   (Organization/Section Receiving Data/Sample)
2. _____
   (Organization/Section Receiving Data/Sample)
3. _____
   (Organization/Section Receiving Data/Sample)

Chain of Custody:

1. _____
   (Signature, Title, Date Deposition)
2. _____
   (Signature, Title, Date Deposition)
3. _____
   (Signature, Title, Date Deposition)

Form 3
Request for Laboratory Analysis

Collected By: _____
Section, Branch, or Agency: _____
Test Approved By: _____
Date and Time Collected: _____
Site: _____
Address: _____
Method of Collection: _____
Purpose of Analysis: _____

Samples

I.D. Number	Location	Lab I.D. Number

Remarks/Comments

Chain-of-Custody

Relinquished By: _____ **Date/Time:** _____ **Was Seal Intact? Yes / No**

Received By: _____ **Reason:** _____

Relinquished By: _____ **Date/Time:** _____ **Was Seal Intact? Yes / No**

Received By: _____ **Reason:** _____

Relinquished By: _____ **Date/Time:** _____ **Was Seal Intact? Yes / No**

Received By: _____ **Reason:** _____

Form 4
Single Filter $PM_{2.5}$ Data Sheet

Site Identification/Name:_____/_____

LABORATORY INFORMATION:

Laboratory Operator initials: _____ **Sample Frequency (circle):** 1/1 1/3 1/6

Filter ID:_____ **Cassette ID:_____** **Installation Date:_____**

Sample Type (circle): FIELD SAMPLE or FIELD BLANK

Filter Information: **Initial Weight: _____**mg Date
Final Weight: _____mg Date

Calculated Concentration: _____µg/m^3

Sample Receipt Date/Time:

Min/**Max Temp. of Filter During Transport: _____/_____**°C **Initials:**

Sample Start Date: _____ **Sample Stop Date: _____**

Sample Start Time: ___00:00**___** **Sample Stop Time: ___**00:00

FIELD INFORMATION:

Sample Set-up:

Date/Time Sample Set-up:_____/_____Set-up Operator:_____
WINS #: 200FA
Conditions at Time of Sample Setup :(Pa = pressure, T_a = ambient temp.)

Indicated P_a:_____mmHg **Reference P_a:_____**mmHg **Ref ID: _____**

Indicated T_a:_____°C **Reference T_a:_____** °C **Ref ID:_____**
(Ambient pressure must be within ± 10 mmHg and ambient temperature must be within ± 2°C)

Sample Pick-up:

Date/Time Sample Pick-Up:_____/_____Pick-Up Operator:_____

Final Conditions of Sample Pick-up (as retrieved from 5 data storage screens):

Valid Elapsed Time:_____hr **Volume_____** m^3 **% CV _____**

Form 4 Continued

	Minimum	Average	Maximum
Ambient Temp. (AmbT)	**^{o}C**	**^{o}C**	**^{o}C**
Ambient Pressure (Pres)	**mmHg**	**mmHg**	**mmHg**

Any status conditions or power failures should be recorded in notes as well as in the monitor logbook.

Was Sample Shipped Cold? YES NO
(If sample is questionable, please explain in notes)

Monitor in WAIT or SAMPLING mode prior to leaving site? YES NO

Air supply hose reconnected to the Supply magazine? YES NO

WINS Impactor and First Stage Inlet installed and secure? YES NO

Temperature probes installed and secure? YES NO

All procedures recorded in monitor logbook? YES NO

NOTES: